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CHARACTERISTICS AND TENDENCIES IN THE STEEL INDUSTRY, GLOBALLY AND REGIONALLY

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The objective of this paper is to highlight the current state of the steel industry at the global and regional level, in terms of its level of important indicators, such as: production capacity, production volume, level of consumption, exports and imports. The data used are systemized on time intervals, resulting in that the steel industry remains an attractive sector for investors in terms of large profits generated, but extremely sensitive to economic fluctuations and measures taken by the authorities. In this regard, the disparities and trends of the analyzed periods at global and regional level highlight the different ways of managing the situation in the steel sector, overcapacity representing a highly controversial element nowadays.

Key words: steel industry, apparent steel use, overcapacity, trade, economic growth

INTRODUCTION

The importance of the metallurgical sector in industry is undeniable. The strategic position of the steel industry worldwide gives it an advantage compared to other industries. The products obtained, and, in particular steel, are widely used in various sectors, contributing to the overall economy. In this context, the idea drawn from a study of the European Commission, according to which metallurgy "is the core activity underpinning primary metals production, alloying and processing, production and material flow (e.g.: reuse and recycling); these activities account for 46 % of the total manufacturing value and 11 % of the total gross domestic product (GDP) in the European Union", clearly demonstrates the role and needs of this industry [1]. Currently, steel production occupies an important place in the entire society, but its maintenance is dependent on the identification of new techniques of production and alloying, so as to ensure the reduction of production costs amid improved functional, technological and economic properties and utility of steel (especially in the context in which aluminum is a highly attractive alternative). In this regard, in recent years it has been noted the increasingly large scale application of the special procedures of elaboration and treatment of steels (the transfer of certain metallurgical processes outside the furnace, either in the ladle or in specialized equipment), generating a series of benefits (increased productivity, reducing energy consumption, improving quality of steels etc.) [2].

Moreover, a permanent concern of operators in the steel industry is to apply the latest production technologies, energy efficient, economical and less polluting. Costs of raw materials and energy resources remain real challenges requiring sustained efforts in terms of product innovation and increasing labour productivity. In addition, an important challenge is the retraining of the employees, according to the new generation of steelmaking technologies geared to reducing CO_2 emissions.

ANALYSES AND COMPARISONS WITHIN THE STEEL INDUSTRY GLOBALLY AND REGIONALLY

Globally, the steel industry ranks second, after oil and gas, with an estimated turnover of about $ 900 billion [3]. The widespread use of steel in various sectors and its characteristics compared to other materials have led a large number of economic operators, in which over two million people operate (if it is taken into account the links with other industries, the number of jobs in the steel industry worldwide is estimated at 50 million). Unfortunately, a desire to obtain a higher profit in any activity can be found in the steel industry. Both investors and public authorities intuited the sector's ability to generate high profits, which led to the creation of new production capacities or the development of existing ones.

China is characterized by production overcapacity (caused by subsidy policy practiced by the authorities), which causes an excess that cannot be absorbed by the domestic market. It should also be noted that this country is facing economic difficulties caused by the fact that economic development was mainly based on exports rather than domestic consumption.

This is also visible in the iron and steel sector, where the export volume was 92,9 million tonnes in 2014, i.e. more than 2,2 times higher than exports made by Japan,

G. Bălan, Romanian-German University of Sibiu, M.D. Ungureanu, Spiru Haret University of Bucharest, G. Dobrotă, University Constantin Brâncuși of Târgu Jiu, România

which ranks second among exporters of raw steel, Table 1 (this ratio was exceeded even in the first 9 months of 2015, respectively by 2,48 times).

Table 1 **Production, exports and imports**

Country	Production		Exports		Imports	
	Mt		Country	Mt	Country	Mt
	2014	2015*				
China	822,7	608,9	China	92,9	US	41,4
Japan	110,7	78,8	Japan	41,3	Germany	24,3
US	88,2	60,6	South Korea	31,9	South Korea	22,4
Italy	86,5	16,7	Russia	27	Italy	16,6
South Korea	71,5	51,8	Germany	24,8	Thailand	15,1

Source: data collected from [3]
Legend: 2015* - date for the first nine months; Mt – million tonnes

Can it be assumed that this aspect is only China's problem? The answer is clearly "no", and it is justified by the fact that the situation recorded in a region may directly affect other regions, through large exports. A good example is represented by the significant exports of flat products from China into the European market, which prompted a reaction from the European Commission towards achieving the anti-dumping investigations on products from China and Taiwan. In addition, there remains the problem of carbon dioxide emissions generated by the high production of steel.

But, the existence of overcapacity of production occurs does not only in China but is a delicate situation at the level of many countries (India, South Korea, etc.). The authorities' decision to support existing units or to pursue the creation of new capacities (often, social reasoning prevailed over economic ones, especially in election years), has contributed to the maintenance of overcapacity, given that demand has also decreased (obviously, other factors have influenced the gap between existing and appropriate capacity for the market, but their influence was smaller compared to the one mentioned above).

In accordance with the OECD, in 2014, nominal capacity at the global steel industry was of 2 241 million metric tonnes (Mmt), compared to 1 060 Mmt in 2 000. In 2015, production capacity is by 2307 Mmt, and, because there are many investment projects, it is considered that the growth trend will be maintained for 2017 being estimated a capacity of 2 361 Mmt.

Also, noteworthy is the existing situation globally and regionally with regard to the modification of production capacity. Therefore, in 2014, compared with the previous year, only in the EU there has been a slight decrease in steel production capacity, of – 0,9 %, while globally, there was an increase of 9,1 % amid considerable rises in Asia (10,1 %), Middle East (50,5 %) and Africa (20,9 %). Incidentally, in the first 9 months of the year 2015 has been an obvious decrease in the steel production compared to the same period in 2014: - 2 % in Asia, 0,3 % in the EU, - 6,8 % in North America – 2,1 % in China, and more.

The effects of capacity excess are obvious:

- bankruptcies;
- reducing the number of jobs;
- increasing offer at a faster rate as compared to that of the demand;
- decreasing sales prices of products made and implicitly, diminishing rate of return. [4]

In this context, global steel demand could grow at a slow pace, return to the iron and steel industry being negatively influenced by capacity excess. [5] Capacity excess is also highlighted by the situation recorded in demand for raw steel. In this respect, the data in Table 2 can be observed, set for the period 2007-2015.

Table 2 **The evolution of the global demand for raw steel in the period 2007-2015***

Year	Demand Million metric tonnes	Rate of growth / %	Real GDP growth / %
2007	1 340	-	5,7
2008	1 338	- 0,14	3,1
2009	1 253	- 6,35	0,0
2010	1 429	14,04	5,4
2011	1 513	5,87	4,2
2012	1 532	1,25	3,4
2013	1 607	4,89	3,4
2014	1 614	0,43	3,4
2015*	1 513	- 6,25	3,1

Source: data from [6]; author's computations based on date from [7]; *estimated

In the period under review, an increasing trend for the years 2010 – 2014 can be noticed, after the reduction for the period 2007-2009. Therefore, the data summarized in the above table demonstrates a correlation between demand for raw steel and the period of economic development, but also the action of other factors, including increased production capacity (mentioned above) and steel consumption. Moreover, in 2014 was registered one of the biggest gap between the production capacity and demand for steel (627 million metric tonnes).

For dimensioning steel demand in terms of volume, the World Steel Association has proposed to use the indicator Apparent Steel Use (ASU), which provides information on the steel demand growth trends. Thus, it the steel consumption in a country or region can be established and the average value used for a person. The calculation of this indicator is reflected by the following equality:

$$ASU_{fs} = D_{fs} - E_{fs} + I_{fs} \quad (1)$$

where: ASU_{fs} represents the Apparent Steel Use finished steel; D_{fs} – Deliveries finished steel; E_{fs} – Exports finished steel; I_{fs} – Imports finished steel.

With regard to this indicator, systemized data can be seen in Table 3, where annual percentage changes are reflected of the apparent steel consumption.

Table 3 **Apparent steel use at the global and regional level / %**

Year	EU 27	Asia	China	World
2007	5,4	9,45	10,77	6,95
2008	- 7,7	4,09	6,81	-0,01
2009	- 34,87	9,21	23,38	-6,45
2010	21	9,61	6,56	14,04
2011	7,53	7,33	7,94	7,32
2012	- 10,48	1,79	1,87	1,23
2013	0,86	7	8,35	4,87
2014	4,55	2,36	1,51	3,77
2014/2007	- 22,2	63,24	88,19	34,92
2015*	2,11	0,58	-0,51	0,46

Source: author's computations based on date from [3] and [4]
*in comparison with the same period for previous year

It should be noted that this indicator highlights the clear link between steel demand and the economic boom or recession phase at the level of an economy.

In light of this indicator, the largest consumer is China, in the year 2014 representing 46,23 % of the total global consumption (710,8 / 1 537,3 million tonnes of finished steel products), positions two and three being occupied by the US (106,9 Mt) and India (75,3 Mt).

Another important indicator proposed for analyzing the demand for steel is True Steel Use (TSU) which is obtained by deducting net indirect exports of steel from ASU. Indirect exports are the goods incorporating steel produced within a country, which make the subject of exports. The relevance of this indicator stems from the fact that it allows accurate quantification of the amount of steel used in a country. The biggest real consumption is registered in China and the USA.

TENDENCIES RECORDED AT THE PRODUCTION OF RAW STEEL

Widespread use of steel caused a continuous increase of the production, differently from one region to another, its growth being highlighted in Table 4.

The data summarized in Table 4 show an increase of raw steel production in almost all regions considered, except EU and North America. Therefore, worldwide, there is a rapid increase in production in the period of 2000 - 2009, followed by a slowdown to about 3,3 % / year in the period 2010 - 2014. In contrast, the largest increase is observed in China, respectively over 2000 % and 785 Mt (apparently, a significant percentage increase was registered in the Middle East region, but, quantitatively, the situation is not the same: 1,2 Mt in 1980 and 29,98 Mt 2014). China's supremacy was manifested and in 2015, her production of crude steel in the first 9 months accounting for 51 % of world production, compared with 10 % at the level of EU, 7 % in Japan, 6 % in India and 5 % in US. As a result, the EU's concern on products from China seems justified, the continuous development of new innovative processes and technologies being necessary. Moreover, the economic operators in the metallurgical industry is essential ,,to develop the research and innovation activity, so as to obtain top products in the processes of efficient energy and low costs" [8].

The difficult situation is also evident by the fact that the decline in raw steel production in the world is not recorded in the case of China. The massive exports made by this country have allowed maintaining steel production on a growing trend and influencing negatively the steel production in other countries given that domestic demand has positioned itself below production volume (synthesized data suggests a clear discrepancy between China and the world in terms of raw steel production).

The clear trend of increasing raw steel production is caused by its use in various sectors. Thus, in 2014, the following distribution of steel consumption on sectors can be noticed: 51,2 % in constructions; 16,8 % in transport; 14,5 % in machinery; 12,5 % in metal products; 2 % in domestic appliances and 3 % in electrical equipment.

CONCLUSION

Steel is one of the most important materials used today, because of its characteristics and the possibility of large-scale application in various industries. The steel industry has become a strategic branch at any national economy, which has resulted in increased interest of authorities and investors for its development, who have expected to obtain significant profits. The most important effect was a production overcapacity, with negative implications economically and socially. China is clearly distinguishable from other countries, both in terms of

Table 4 **The evolution of the growth rhythm of crude steel production / %**

Country/Region	1980-1989	1990-1999	2000-2009	2010-2014	2014/1980	2015* Mt	2015/2014
World	9,71	2,56	45,71	16,51	133,13	1212	- 2,4
EU28	-2,08	0,85	-27,92	2,08	-18,62	127,5	- 0,3
North-America	-9,52	16,68	-38,11	44,63	-2,92	85,1	- 6,8
South-America	57,81	18,12	-3,41	2,63	108,15	33,35	- 1,4
Africa	18,10	-6,90	11,37	-9,64	30,76	10,74	+ 0,5
Middle East	185,31	140,62	64,80	49,93	2 255,5	20,91	+ 1
Asia & Oceania	26,87	29,74	139,02	23,59	516,16	833,24	- 2
China	65,91	86,81	349,08	28,79	2 116,26	608,94	- 2,1

Source: author's computations based on date from [3]; date from [9]; *first nine months;
Legend: 2015/2014 represent the report between the values for the first nine months of the two years

excess production and from the point of view of growth in production volume.

The situation indicated has affected producers from many countries (especially the EU) in the context where products exported from China have entered their markets. Another conclusion that emerges from the analysis is that the iron and steel industry is influenced by the economic situation through several channels: the decline in consumption during recessions; volatility of raw material prices; rising energy prices; worsening situation in the sectors using products supplied by it. The way development policies of the steel industry were designed and implemented led to significant regional discrepancies in terms of volume of steel production, exports, imports and consumption. In the EU 28, a negative rate of steel production in the last 45 years can be noted, while China has come to produce about 50 % of global raw steel. In this context, the main question which arises for economic operators is to allocate significant resources for research, creation of competitive products, implementation of new technologies that allow reducing production costs and increase labour productivity.

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